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EFFICACY OF MANDIBULAR ADVANCEMENT DEVICE IN OBSTRUCTIVE SLEEP APNEA SYNDROME

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ABSTRACT

Mandibular propulsion device is a non-surgical, mechanical means of treating sleep apnea. Left untreated, OSA can have serious consequences. The aim of this study was to evaluate the efficacy of mandibular advancement orthoses in the treatment of Obstructive Sleep Apnea Syndrome (OSAS). This was a systematic review including ten recent articles reporting on mandibular advancement orthosis and OSA. The articles concerned described the efficacy of the mandibular orthosis in reducing nocturnal apneas and hypopneas. Despite its place as a second-line therapy in the face of continuous positive airway pressure (CPAP), the mandibular orthosis can be complementary to CPAP.

Key words: Apnea, efficiency, mandible, syndrome.

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Volume 07 || Issue 02 || February, 2024 ||

1. Introduction

Obstructive Sleep Apnea Syndrome (OSAS) is defined as the occurrence during sleep of abnormally frequent episodes of complete or partial obstruction of the upper airways, responsible for interruptions (apneas) or significant reductions (hypopneas) in ventilation. of the upper airways, responsible for significant interruptions (apneas) or reductions (hypopneas) in ventilation. The frequency of obstructive airway events is considered abnormal when there are more than 10 apneas or hypopneas per hour of sleep (apnea-hypopnea index (AHI) greater than 10) [1]. Prevalence is estimated at 2% in women and 4% in men in the general population [2]. Its consequences can be serious for the patient and those around him or her: risk of daytime sleepiness with domestic or traffic accidents, cardiovascular complications: atherosclerosis, arterial hypertension, coronary ischemia and stroke [3]. Mandibular propulsion orthoses (MPOs) represent a non-surgical mechanical means of treating sleep apnea. They are devices designed to propel the mandible during sleep, in order to enlarge the pharyngeal airway [4]. The aim of this study was to evaluate the efficacy of the mandibular advancement orthosis in the treatment of Obstructive Sleep Apnea Syndrome (OSAS).

2. Methodology

Type of study: Study based on a systematic review.

Study duration: The study ran from January to February 2024.

Study population: The study focused on articles evaluating the effectiveness of mandibular advancement orthoses on Obstructive Sleep Apnea Syndrome (OSAS) using the PRISMA method.

Inclusion criteria: We included all articles evaluating the effectiveness of mandibular advancement orthoses on Obstructive Sleep Apnea Syndrome (OSAS) before 2024, in English and French.

Sampling: A total of 10 articles were selected**.**

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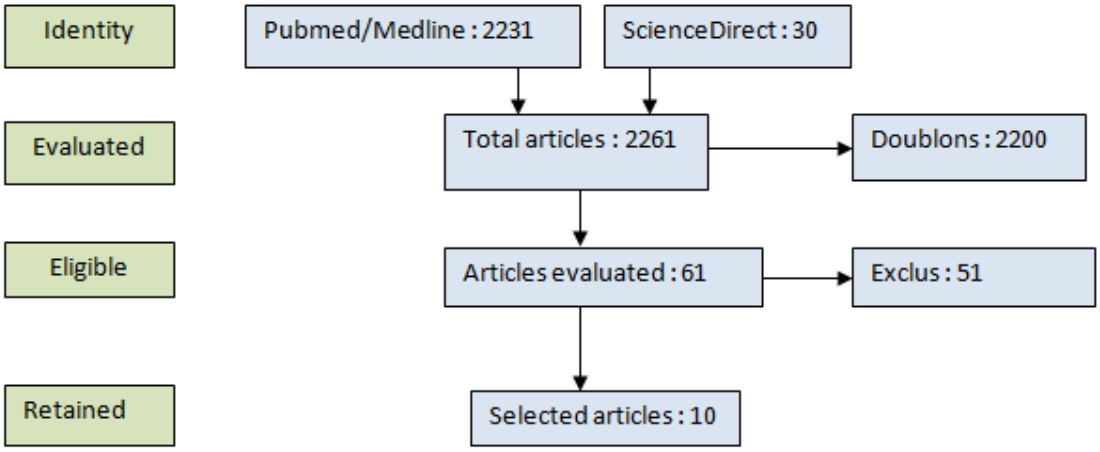

Search strategy: The search engines used were PubMed and Sciences Direct using the keywords: " apnea, efficiency, mandible, syndrome" indicated in Mesh Bilingue and the search operators used were: "And, Or, Not".

Variables: The subject variable was based on the effectiveness of mandibular advancement orthoses on Obstructive Sleep Apnea Syndrome (OSAS).

Articles	Orthodontics et periodontics
Year of publication	effectiveness of mandibular advancement
Continent	orthoses on Obstructive Sleep Apnea
Language	Syndrome (OSAS)
Types of articles	

Data collection and analysis: Data were then collected on a pre-tested and validated data extraction form and analyzed on SPSS 21.0.

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RAKOTOSON Mariette [1]*

Volume 07 || Issue 02 || February, 2024 ||

3. Results

Number of articles	Titles and authors	Results
1	Orthodontic appliances for sleep apnea, a cephalometric and poysomnographic study. *David M, Saba SB, Rodenstein D, Rombaux P*	« Orthodontic appliances are unquestionably effective in reducing the number of obstructive apneas and hypopneas.» **[5]**
2	Long-term dental and skeletal effects of mandibular advancement devices in adults with obstructive sleep apnea: A systematic review *Patel S, Rinchuse D, Zullo T, Wadhwa R*	" Mandibular advancement orthoses can cause a statistically significant, albeit slight, change in dentition when worn for long periods. » **[6]**
3	Mandibular advancement device use in obstructive sleep apnea: ORCADES study 5-year follow-up data *Vecchierini MF, Collet JM, Marie-Pia, Goutorbe F, Kerbrat JB, Leger D, et al*	« mandibular advancement device therapy remained effective in >50% of patients after 5 years" **[7]**
4	A mandibular advancement device for the treatment of obstructive sleep apnea: Long-term use and tolerance *Brette C, Ramanantsoa H, Renouardierea J, Renouardiere R, Roismana G, Escourrou P*	« OPM J reduces symptoms of long-term SAHOS.» **[8]**
5	Orthodontics treatments for managing obstructive sleep apnea syndrome in children: A systematic review and meta-analysis *Huynh NT, Desplats E, Almeida FR*	« These orthodontic treatments may be effective in managing pediatric snoring and obstructive sleep apnea" **[9]**
6	The First Steps of the Management of Sleep Apnea Syndrome in Yaounde *Massongo M, Bouba AD, Siafa BA, Adamou BD, Komo NME, Yone PEW*	« Compliance and therapeutic efficacy were judged to be good» **[10]**

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7	Preventive dentofacial orthopedic treatment of childhood apnea/hypopnea syndrome? *Guibert M, Garcia R*	"Early adapted treatment should reduce this risk" **[11]**
8	Epidemiological, clinical and evolutionary profile of obstructive sleep apnea syndrome in Department of Respiratory Diseases of the CHU Ibn Rochd in Casablanca *Zaghba N, Chaanoun K, Benjelloun H, Yassine N*	"Mandibular was prescribed in 86% of cases." **[12]**
9	Relationship between edentulism and sleep apnea: a systematic review of the literature *Ammar S, Mabrouk Y, LAbidi A, Mansour L, Trabelsi M*	"In 6 studies, an improvement in sleep apnea was noted with wearing the prosthesis at night" **[13]**
10	Sleep apnea and prosthodontic implications *Chander NG*	"It is vital to be aware sleep disorders and the possible impact that can aid in providing effective care to the patients reporting to prosthodontic clinics" **[14]**

4. Discussion

Sleep apnea syndrome (SAS) is a sleep disorder characterized by a cessation or reduction in respiratory flow. It is defined by the number of apneas and hypopneas per hour. The diagnosis of SAS is made as soon as the apnea index (AI) is greater than five (recording of more than 5 apneas per hour) or as soon as the apnea hypopnea index (AHI) is greater than ten (recording of more than 10 apneas and/or hypopneas per hour) [1].

Removable braces are proposed for snoring patients with a measured index greater than 35, irrespective of the presence or absence of OSA. The degree of mandibular advancement depends on the individual's maximum propulsion capacity, without inducing pain in the temporomandibular joints [15]. The QuietKnight is a device consisting of two thermoplastic parts linked together by a mechanical system. The two parts are softened in boiling water for a

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RAKOTOSON Mariette [1]*

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few minutes and then molded onto the upper and lower teeth. A hook system is attached to the upper part of the appliance and engages with a clamp on the lower part. A screw in the upper hook system is inserted to adjust the mandibular advancement of the lower part of the appliance. The appliance allows the patient to breathe through the mouth.

The Mandibular Positioner (MP) is a mandibular propulsion device made of thermoformable plastic, which joins the lower jaw to the upper jaw in a propulsive movement. From the outset, it does not allow oral respiration or any other mandibular movement.

The Herbst propulsion device has been in use for many years. A system of connecting rods holds the mandible in the propulsive position and allows this forward movement to be adjusted [16]. This device offers the advantage of enabling some mandibular movements, such as opening and closing the mouth, but also lateral movements.

The Mandibular Positioner and Herbst are made from the patient's own dental casts. Patients were asked to wear their appliance every night for one month. At the end of this period [5].

According to the authors, when the prosthesis is placed in the mouth, the mandible rotates downwards.

activity of the genioglossus is increased, which may widen the retro-lingual space by shifting the tongue forward [17].

The prosthesis can also promote an increase in the neuromuscular activity of the pharyngeal muscles, which is typically reduced during sleep, and can induce changes in the position of the mandible, soft palate and tongue, helping to improve pharyngeal permeability [17].

Some authors have also considered that, in the supine position, the intercuspidation provided by the prosthesis could act as a brake against backward displacement of the mandible [18].

The prosthesis restores the vertical dimension of occlusion and consequently increases the retro-pharyngeal space [19].

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In this respect, a cephalometric analysis of a subject with a prosthesis in the mouth showed an average increase of 1.88mm in the width of the retro-pharyngeal space and an average increase of 2.20mm in the depth of the pharynx compared with the analysis without a prosthesis [17].

Mandibular advancement orthoses are currently considered to be the treatment of choice for OSA [20].

4. Conclusion

OSA combines a reduction in the size of the upper airways with an alteration in their muscular activity. Removable propulsive appliances can reverse these alterations by moving the mandible anteriorly and changing the position of the soft palate and tongue. Orthodontic appliances are effective because they increase the size of the upper airway, provide a stable anterior position for the mandible, move the tongue and soft palate forward, and modify the activity of the genioglossal muscles. These devices improve nocturnal ventilation without impairing sleep quality. The treatment is simple, reversible, non-invasive and cost-effective.

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